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Total quality management : involvement of craft-level workers on capital investment projects

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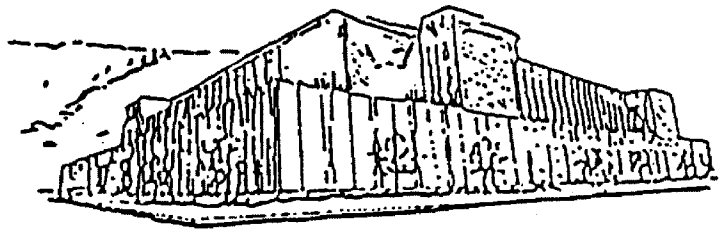
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**TOTAL QUALITY MANAGEMENT:
INVOLVEMENT OF CRAFT-LEVEL
WORKERS ON
CAPITAL INVESTMENT PROJECTS**

by

Matthew Hamlin

The University of Montana, 1997 presented
in partial fulfillment of the requirements
for the degree of
Masters of Business Administration

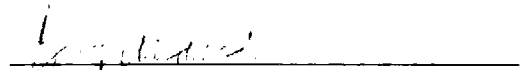
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Spring 1998

APPROVED:

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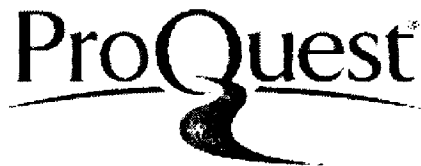


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ABSTRACT

Hamlin, Matthew, M.B.A., May 1998

Total Quality Management: The Involvement of Craft Level Workers on Capital Investment Projects (39 pp.)

Chair: Dr. Gary Cleveland

Total quality management is quickly becoming the management philosophy of the new age. Yet the construction industry continues to avoid the use of total quality management. Many industry leaders feel that the philosophy cannot be applied to an industry with high customization and high worker turnover rates. A few companies have taken strides to introduce quality management programs with capital investment projects, despite the barriers to implementing these programs that the construction industry faces.

The subject of how to involve craft-level workers in those programs has been almost completely avoided in the literature to date. This paper will explore the relationship between craft-level workers and quality management programs. The paper will be based on an intensive literature review as well as empirical case studies of quality management programs introduced with capital investment projects.

INTRODUCTION

The philosophy of Total Quality Management (TQM) has an ever-growing sphere of influence. The construction industry of America was one of the last sectors of the economy to experiment with TQM. Yet, the success of quality initiatives in other industries has spurred the construction industry to investigate this management philosophy. Before this stimulus, the construction industry had been slow to develop quality management programs on capital investment projects.

Barriers to TQM Programs

Several characteristics of construction projects act as barriers to TQM programs or similar quality management programs. Rosenfeld, Warszawski, and Laufer (1992) identified four factors that make quality initiatives difficult to implement in the construction industry. First, the very nature of the one-of-a-kind large unit construction project hinders the multiplicative effect of method improvement. In other industries, workers and management can better hone the processes involved in producing the product or products. For example, Ford Motor Co. employees that are producing Ford Escort vehicles can become very efficient in producing that vehicle. Over time the line personnel and management make small adjustments to perfect the process. In the construction industry, due to the differences between projects,

the workers and management cannot reach the same degree of process efficiency that the Ford personnel building the Escort are able to achieve. The second problem is the dynamism of the construction project, where the shape of the constructed facility and the pattern of operations change continuously, as do the production problems. It is difficult to fit quality management programs into the quickly changing environment of the construction project. The third problem that arises is the instability of the workforce. Quality management programs rely on group dynamics and the development of a team spirit. On the construction site, temporary employment and high turnover, tend to work against the quality program. The fourth problem results from doubts and questions raised as to whether construction workers are capable of generating sufficient valuable and viable input to justify the effort, time, and money needed to establish a quality management program.

Successful Initiatives and Insights

The above arguments suggest a priori that quality programs would not be feasible on construction projects. Despite these same problems facing construction all over the world, Japanese construction companies have been successful in implementing quality management programs. Total quality control was first introduced in construction by Takenaka Komuten Company

in the 1970's (Gilly et al., 1987). In fact, three Japanese contractors have won the Deming Prize for quality improvement (Burati et al., 1992).

Furthermore, Rosenfeld and associates conducted extensive research involving the applicability of quality circles to capital investment projects. The researchers worked with the Israeli National Building Research Institute, Haifa, Israel, to examine the effects of quality circles on five construction projects over the entire life of those projects. The results of the quality circle implementations were positive in all five projects; the degrees of success varied, depending on other factors (Rosenfeld et al., 1992).

Examination of the typical construction project work force as well as the work environment leads to interesting insights. For example, by nature the construction work force must work together in small groups or teams. Problems or changes tend to arise more often than in a manufacturing environment. In order to deal with the problems workers must cooperate with other workers and foremen, who are often from differing trades. Moreover, with each new building phase, workers and management alike must re-examine the work process. All of these factors, cross-functional problem solving, teamwork, and process improvement, fit very well with the constructs of total quality management. Success of quality management programs on construction sites should not be ruled out a priori.

Craft Level Workers

Look back to the barriers of implementation that the construction industry faces. Barriers to the implementation of TQM, such as the constantly changing work environment and high turnover stimulate examination of these quality programs from the craft-level worker's perspective. How do quality initiatives on the job sites actually affect craft level workers? This same question is being asked in other industries as well. For example, Guimaraes (1997) researched the affect that TQM had on employee turnover rates, and Lam (1996b) investigated the impact that TQM had on middle managers and frontline workers. Neither researcher found significant benefits for the workers. In fact, Lam suggested that too much emphasis is placed on satisfying the customers' needs and not enough emphasis is placed on satisfying the needs of employees.

Much of the original quality management literature focuses on management's role in the quality process. Choi and Behling (1997) point out Feigenbaum's (1951) assertion: "Quality-consciousness depends upon many intangibles, among which management's attitude toward quality is paramount. Basic quality responsibility rests in the hands of company top management." Yet, in order for any type of quality management program to be successful, it must extend to the craft level workers as well, because everyone affects the quality of the product. In fact, the craft level workers on the "frontline" may have more control over quality than any other group of

people in the entire organization. Thus, it is logical that the quality management program must involve them to assure true success.

The construction industry's specialized workforce presents new problems with regard to satisfying employee needs. Before quality management programs can be successful on capital investment projects, these needs of the employees will have to be resolved. The question is, how are the successful quality management initiatives on construction sites addressing employee problems and how do they affect the frontline craft workers.

OBJECTIVES AND APPROACH

The study was designed and conducted to achieve the following objectives:

- 1) *To determine whether quality management was taking place on the job sites of capital investment projects and to identify quality management initiatives.*
- 2) *To determine which levels of the organizations were involved with these quality management programs. Specifically, to determine whether craft level workers were being involved in the quality management programs, and how they were being involved.*

- 3) *To determine whether or not the quality management programs were beneficial to the contractors in terms of lower turnover rates, higher productivity, and lower absenteeism.*
- 4) *To determine the benefits to the workers in terms of employee satisfaction, more decision-making freedom, less direct supervision, and more responsibility.*

METHODOLOGY

This study is a literature review augmented by the small-n, multiple case study approach. Four construction contracting firms were assessed. The four firms were chosen according to the following criteria: 1) the construction management or contracting firm had to have a quality management program in place, and 2) the firm had to approve a request for research. The firms were found and selected through articles about total quality management in ENR (Engineering News Record) as well as through industry contacts. Brief phone interviews were conducted with representatives from each of the firms prior to research. These interviews served to establish an outline of the quality management techniques used. The four firms represented a mixture of size and type of construction.

An extensive literature review was conducted. From the literature review, essential background information was obtained with regard to

quality management in the construction industry. Conclusions were then drawn from the literature. Data from the case study research was used to support these conclusions. The areas of literature that provided the most information for this study originated in construction literature, human resource management literature, and quality control literature. To date, there is little research regarding craft level employees involved in total quality management. Therefore, this is a fertile field for exploratory research.

Personal interviews were conducted with firm personnel at each of the project sites. Interviews were conducted with personnel at varying levels of organizational hierarchy at each firm. Superintendents, project managers, project engineers, foremen, and craft level workers of various trades were interviewed. Also, program facilitators and initiators were interviewed. For instance, an administrative assistant was chosen to initiate the program in one setting, and in another setting a field engineer aided workers in quality circle discussions, acting as a facilitator. A standardized questionnaire was utilized for all interviews, a copy of which is attached as an appendix. Additional information was gathered through observation of personnel, including project management and craft level workers, at work on the job sites.

The data collected from the questionnaire took on two forms, open-ended answers and five-point Likert scale answers. The Likert scale utilized was as follows: “very low” = 1, “low” = 2, “average” = 3, “high” = 4, and “very

high” = 5. The data was coded and compiled. Data analysis methods included descriptive statistics, correlation analysis, factor analysis, and cluster analysis. According to Kaiser-Meyer-Olkin (KMO) values and Bartlett’s test of sphericity, the data is insufficient for factor analysis. The cluster analysis resulted in no clusters emerging. Moreover, there was no significant correlation among any of the questions or between questions and participants’ organizational positions. Thus, only descriptive statistics are used to infer but not to confirm support or lack of support for the study’s conclusions.

DESCRIPTION OF PROGRAMS STUDIED

Hensel Phelps Construction Company

The capital investment project studied was the Denver Pavillions project, located in downtown Denver, Colorado. Hensel Phelps Construction Company (HPCC) is primarily a commercial general contractor, based out of Colorado. It also has regional offices in California, Texas, and Arkansas. HPCC is a nationwide general contractor.

HPCC runs a program entitled “CIP” or “Continuous Improvement Process” on all of their job sites. The program is centered on “OFI” or “Opportunity for Improvement.” Workers of any level have the option to fill out OFI cards with process improvement suggestions. All workers have

access to OFI cards, and are highly encouraged to fill them out. If they feel uncomfortable about filling the cards out, they have the option of making suggestions to their foremen, who in-turn fill the cards out for them.

Volunteers from the work force are asked to evaluate the OFI suggestions. Virtually anyone working on the job site is eligible to take part in the CIP teams. Facilitators are trained in the quality concepts such as communication and problem solving. These facilitators then direct the meetings and help the team analyze the suggestions. The facilitator's sole job is to maintain the CIP process on the job site. The team uses cost/benefit analysis to evaluate suggestions. Once the evaluations are complete, responses are delivered to those who made the suggestions, whether the suggestions were adopted or not. The CIP team meets a few times a month, depending on how many OFI forms have accumulated. The team is rotated every few months to renew the enthusiasm level of the team. The team members receive on the job training during the meetings.

Each week a safety meeting is conducted, with a portion allotted to quality issues. It is during this allotted time that suggestions are encouraged by the facilitators and quality issues are discussed as a group. A reward system exists for the best suggestions. Good OFI suggestions are passed on to other job sites. Suggestions are selected each year for best regional suggestion as well as best corporate wide suggestion. Those suggestions,

which are chosen by the regional office or the corporate office as the best of the year, are recognized and awarded large cash bonuses.

HPCC also has in place a profit sharing program for its employees. It is stressed that any profit maximizing suggestion that the employees make will in turn benefit them through the profit sharing program. The important OFI suggestions are measured and standardized throughout the entire corporation.

Tarlton Construction Company

The capital investment project studied was the Anheuser Busch, Stock House 19 project, located in St. Louis, Missouri. Tarlton Construction Company is primarily a commercial general contractor. Tarlton is a St. Louis, MO based regional contractor that builds large commercial offices, warehousing, retail, and process facilities. The company utilizes a design build operation style to add value for their customers. A design build approach allows Tarlton to be involved with the design of the project, adding synergy and timesaving.

The Stock House 19 project was Tarlton's first experiment with the total quality management philosophy for Tarlton. Tarlton utilized small group meetings for their quality focus. There were quality circles at the corporate level. Each week there were meetings involving all the foremen, the superintendent, and project management. The meetings coincided with

cost reports. During the meetings new goals and schedules were set. The foremen in turn provided the information to their crews in a “toolbox meeting” format. The foremen in turn solicited suggestions from their crew, which then could be communicated to the project management. Once the goals are met, they are communicated back to the field, and sometimes there are celebrations for meeting the goals.

Tarlton made it a goal to provide their workers with access to the people with who they need to communicate. Tarlton personnel try to create an open environment that allows free flow of ideas and suggestions. Tarlton constantly solicits input to improve productivity from all levels. At the same time, they try to keep the program simple. The workers or management did not receive formal training in the quality concepts per se. Yet, the superintendent and foremen made it a point to ask for suggestions and complaints from the workers. They took on the attitude, “if the workers are happy, then the customer is happy.”

Additionally, when problems arose, problem solving teams were formed that consisted of various trades. These teams stayed together until the problem was resolved. These teams primarily consisted of project management and sometimes foremen. These teams then report results at the project management meetings.

Peter Kiewit and Sons Construction

The capital investment project studied was the Interstate 80 reconstruction project, located in Salt Lake City, Utah. Peter Kiewit and Sons is one of the largest contractors in the nation, with much of their work taking place overseas. It is primarily an industrial and road construction contractor. For this particular project, Peter Kiewit and Sons partnered with two other construction companies. The immense size of the project was the reason for the partnership. A limited liability company was formed between the three construction companies and was called Wasatch Construction. The name was coined from the Wasatch mountain range outside of Salt Lake City. Peter Kiewit and Sons held a 50% interest in Wasatch.

This particular project employed a relatively new concept of quality control. The owners required a quality control plan with the bid package. Wasatch chose to introduce a quality assurance branch in addition to quality control. The owners, Utah Department of Transportation (UDOT), basically run the quality assurance branch. Rather than simply utilize state agency inspections, UDOT works with Wasatch on site. UDOT maintained a large staff at the project headquarters. Additionally, they maintained site operations at each of three project segment sites. This process eliminated the need for state inspections, as UDOT was integrally involved with all quality decisions and processes. A lot of emphasis was put into the control of quality.

Utah Department of Transportation required that Wasatch, as well as the project engineer (Sverdrup Industries) be ISO 9000 certified.

Consequently, Wasatch met the ISO 9000 standards in all areas of their operation, including management. Sverdrup Industries, the engineering firm for the project is ISO 9002 rated, due to the design requirements for Sverdrup. Meanwhile, the Quality Control branch of Wasatch is ISO 9001 rated.

Peter Kiewit and Sons Construction brought to the I-80 project their own form of quality management as well. Each week the foremen hold "PQ" meetings, or "Production Quality" meetings. During the meetings the foremen discuss quality issues with their crew and try to solicit suggestions. Project managers and superintendents are not involved with these meetings, because they feel that by doing so would discourage open input from the workers. Each morning, the foremen also hold "2 minute reminder" meetings. During these meetings, the foremen choose one quality issue to emphasize for the day. A contest is run through the company newsletter for best suggestions. Winners receive cash prizes or other prizes of value. Foremen work with the craft level workers to submit these suggestions.

Murphy Company

The capital investment projects reviewed included a commercial office building as well as a hospital renovation, both located in St. Louis, MO.

Murphy Company is a large mechanical contractor with headquarters in St. Louis, MO. It also maintains a regional office in Denver, CO as well. Murphy Company is one of the larger mechanical contractors in the nation, and was selected 1995 Mechanical Contractor of the year, by the editors of Contractor (Miodonski, 1996). Murphy was chosen for this award because of its pioneering work and continued emphasis in “such areas as total quality management and jobsite safety.”

Murphy Company has adopted a Total Quality Management program entitled “Quality Quest.” Although, the program was initiated from top management and filtered down, the program really focuses on the foremen. In the Murphy Company, the foremen run the on-site operation, and they report to project managers that direct one to several jobs. Consequently, they feel that the foremen are the keys to quality success.

The foremen and project managers receive formal and on-going training in quality concepts and principles, such as continuous improvement, internal customers, and teamwork. The foremen hold daily safety/quality meetings. The foremen discuss with their crews the quality issues that apply to the upcoming day’s operations. The foremen then fill out a form that briefly outlines what was discussed in the meeting that day, and each week all of the forms are collected by the project managers.

Additionally, a company newsletter is sent to the homes of all the Murphy employees. In the newsletters, updates from the “Quality Quest” are

published. Furthermore, OFI (Opportunity for Improvement) suggestions are solicited through the newsletter. Successful OFI suggestions and their authors are announced in the newsletter as well. OFI suggestion updates are periodically sent out with the newsletters. The updates list all OFI suggestions to date along with their status (accepted, rejected, or being evaluated) and the name of the person who submits them. Phone numbers and contact names are listed in the newsletter to facilitate suggestions. Foremen also submit suggestions for their crewmembers.

At the current time, Murphy does not include the craft level workers in the quality management program. The workers are affected by the program, but they do not receive quality concept training. Murphy Co. feels that this is the next step. The workers are, however, involved by being informed of the process and being solicited for input.

CONCLUSIONS DRAWN FROM THE LITERATURE AND DATA ANALYSIS

Several conclusions were drawn from the literature review. Many of these conclusions are supported by the data analysis of the four case studies.

Implementation

An approach resembling quality circles is common to the project quality management programs studied. Management doesn't have time,

however, to form cross functional teams for each little project, nor does it have time to implement statistical process controls. Contractors simply do not have the time for the full implementation of Total Quality Management.

This leads to the question of: what makes up full Total Quality Management implementation? Godfrey et al. (1997) provide a definition of total quality management as being: “a management approach of an organization, centered on quality, based on the participation of all its members and aiming at long-term success through customer satisfaction, and benefits to all members of the organization and to society; involving operational techniques and activities aimed at both monitoring a process and at eliminating causes of unsatisfactory performance.” Hill et al. (1995), describe three tools that are used in full total quality management implementation: improvement tools, such as statistical process control and process re-engineering; measurement methods, such as cost of quality tracking, customer satisfaction measures, and quality defects tracking; organizational approaches, such as quality improvement or action teams, self-inspection, more autonomous work, and exposure of employees to customers.

The approach utilized by the construction firms studied suggests that they do not utilize improvement tools or measurement methods on the job site, yet they very much utilize organizational approaches. Partial implementation is not uncommon. In fact, partial implementation may be

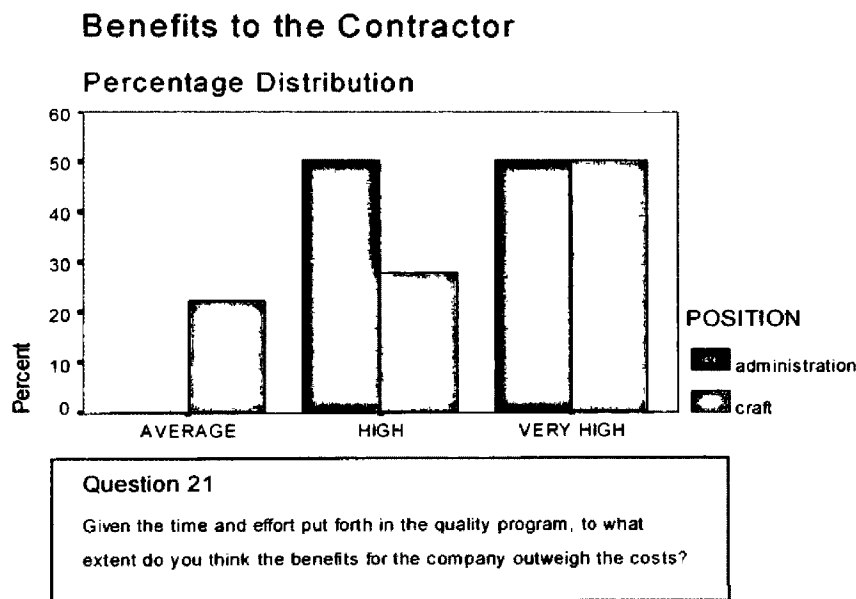
more common than full implementation. Hill et al (1995), report that full implementation in British firms is scarce and note that, with regard to the Baldrige Award criteria, most British firms adopt a “partial” implementation (i.e. firms use only those parts of total quality management that most benefit their firm).

Benefits

Employees and employers gain benefits such as satisfaction and cost savings from the quality management programs. A trend that was apparent throughout the answers of the participants was a perception of benefits from the program for both the company as well as the workers themselves. When asked to what degree they thought that the benefits to the company outweighed the costs, the majority of participants answered “high” or “very high.” The mean score for this question was 4.37 with a standard deviation of .72. Craft level participants scored higher on this question than did the administration level participants. Craft held a mean score of 4.54 compared to that of administration at 4.24. A frequency distribution for this question is depicted in **Figure 1**. The percentage distribution for answers of both project management and craft level workers is illustrated in **Figure 1**. None of the companies kept direct measures of success related to the program, but many provided examples of suggestions that resulted in cost savings. One suggestion, from a Hensel Phelps employee, saved the company an estimated

\$48,000 dollars. The suggestion came from a carpenter, and it created a new method of building concrete forms. Later, someone else expanded on that same idea, saving another \$50,000. Poister and Harris (1997) found empirical evidence of company benefit. In a study of the impact of total quality management on the Pennsylvania Department of Transportation highway maintenance program, they found that the cost of training the workers in quality management philosophies (including their wages) was outweighed by backlog reductions (higher productivity) by a factor of 1.35.

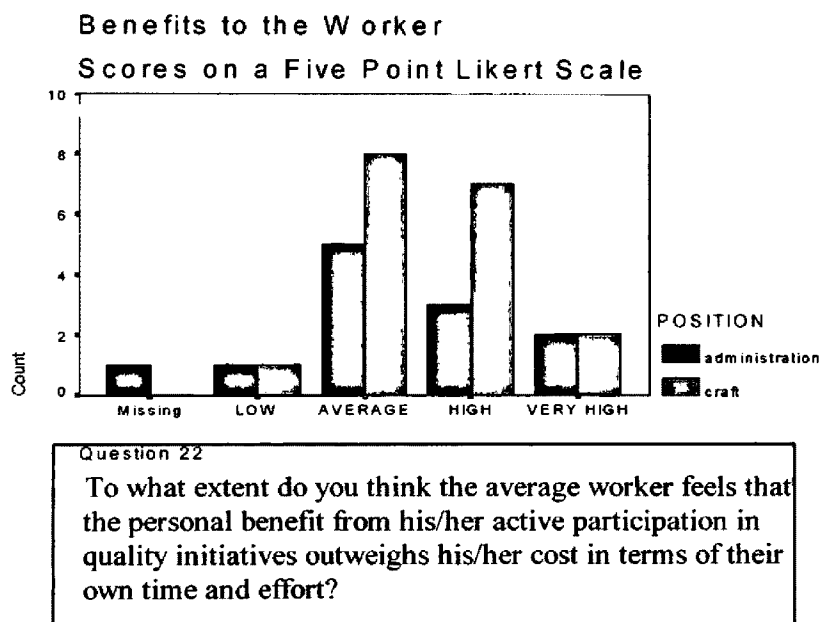
Figure 1



In addition to the company benefiting from the program, participants of the case studies thought that workers benefited from the program as well. When asked to what degree the benefits to the worker outweighed his/her costs the mean score was 3.55 with a standard deviation of .83. In fact, the craft level participants' mean scores were higher than administration level

participants. Craft level participants held a mean score of 3.71 and a standard deviation of .85 compared administration level participants' mean score of 3.33 and a standard deviation of .78. **Figure 2** provides an illustration of the percentage distribution of answers for this question. The answers are broken down into craft level answers and project management answers.

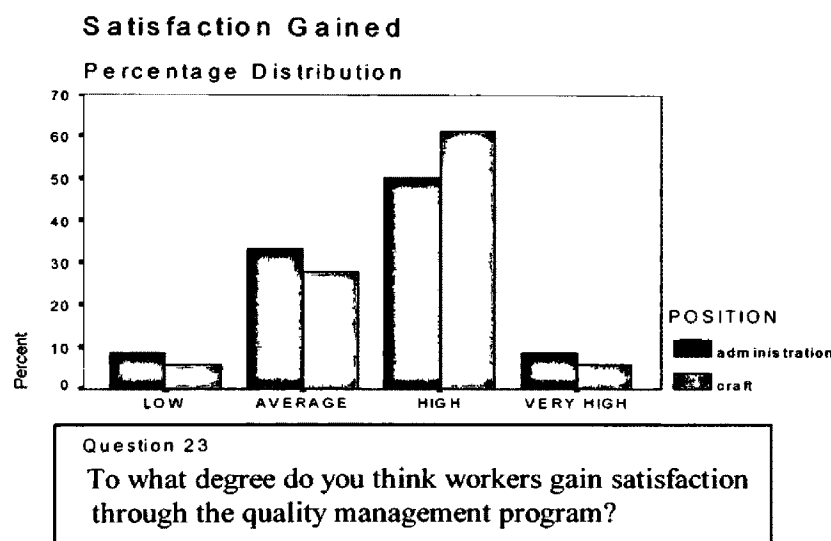
Figure 2



Besides feeling as though the average worker benefited from the program, most participants thought that the average worker gained a relatively high degree of satisfaction from the program. When asked to what degree they thought the average worker gained satisfaction from the quality program, the mean score was well above “average,” with a mean of 3.63 and a standard deviation of .72. Again, the craft level participants scored higher

than did the administrative participants with a mean score of 3.76 and a standard deviation of .56 compared to 3.46 and a standard deviation of .88. **Figure 3** provides a graphic illustration of how participants answered this question. The percentage distribution of the answers is provided with a separation between the answers of craft level workers and those of project management.

Figure 3



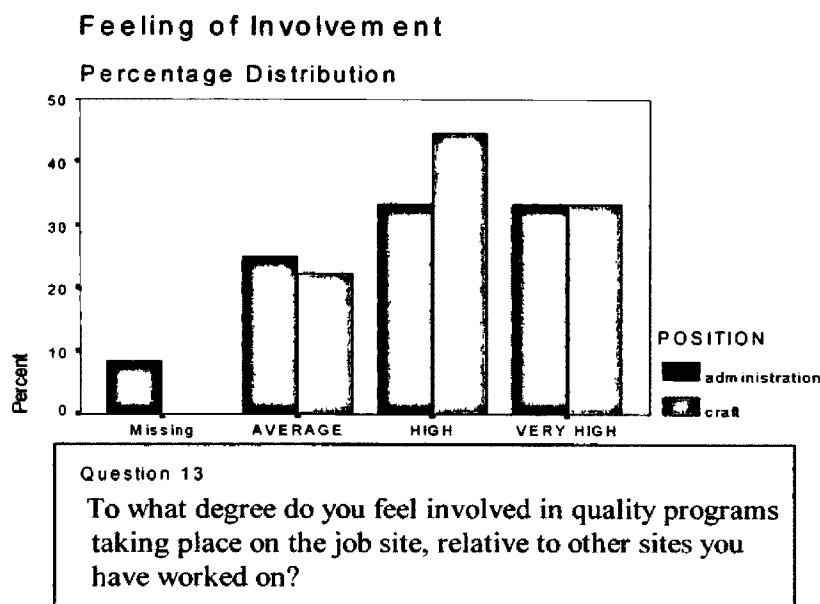
This conclusion agrees with findings of other authors. Guimaraes (1997) found that after total quality management implementation workers reported significantly higher job satisfaction and higher career satisfaction. It is logical to assume that increased decision making freedom would lead to higher degrees of job satisfaction. Cathy Enz and Mark Fulford (1995) found that even a perceived influence over your job leads to increased job satisfaction. Indeed, the data analysis of the case studies revealed a

correlation of .33, at a significance level of .06, between participant responses to the questions of decision-making freedom and the degree to which they gain satisfaction from the program.

Involvement

Workers feel more involved in the company through the quality management program. Throughout all four case studies, the answers of the participants implied that they felt involved. When asked if employee involvement activities were practiced on the site, all of the participants said yes or specified how employees were involved. Not one participant answered “no” to the question. Additionally, when asked to what degree they felt involved in the quality management program the majority answered “high,” with an mean of 4.1 and a standard deviation of 0.71 (note: a “4” would signify “highly involved”). **Figure 4** provides the percentage distribution of answers for this question. The answers of craft level workers are separated from those of project management in the graph. Rounds (1985) indicates that those workers included in the quality circles should undergo an evolution of attitude; going from one of “let’s try it and see” to “I’m becoming involved” and finally to “I am committed to this activity.” Guimareas (1997) found that after total quality management implementation, workers reported significantly higher job involvement.

Figure 4



By allowing workers to participate in decision making and provide input the quality management programs provided the participants with a sense of involvement. Other researchers reached similar conclusions. Fredenall and Robbins (1995) stated, “the use of cross functional teams should increase the employee’s understanding of the entire process and how their task influences other functions. This understanding is likely to enhance the employee’s sense of impact.” Stephen Wood and Riccardo Peccei (1995) also found that employees who participated in departmental meetings or briefings were significantly more likely to exhibit higher levels of quality consciousness.

Focus

The quality management programs are being run for the benefit of the company, rather than the customer. This conclusion is contrary to a basic tenet of TQM, which is customer focus. All four of the firms and their employees held similar views toward the customer. Participants felt only an “average” commitment to the new owners. When asked to what degree the average worker felt a commitment to the new owner, most answered below “average” with a total mean of 2.97 and a standard deviation of 0.93. The score on this question was slightly lower with the administration level participants than with the craft level participants. Craft level participants’ mean score on this question was 3.06 with a 1.03 standard deviation, while the mean administration level participant score was 2.85 with a standard deviation of 0.8. **Figure 5** provides the percentage distribution for this question, broken down into answers by project management and answers by craft level workers. Participants did not think that the new customers influenced the quality program to more than an average degree. In fact, Hensel Phelps Construction Company participants had a mean score of 2.56 when asked to what degree they thought that the new owners influenced the quality management program. This leads to the conclusion that these programs are not initiated simply to appease the new owners. **Figure 6** illustrates the percentage distribution of the question, which asked

participants whether or not the new owners influenced the quality management program. The distribution separates the answers of craft level workers from those of project management.

Figure 5

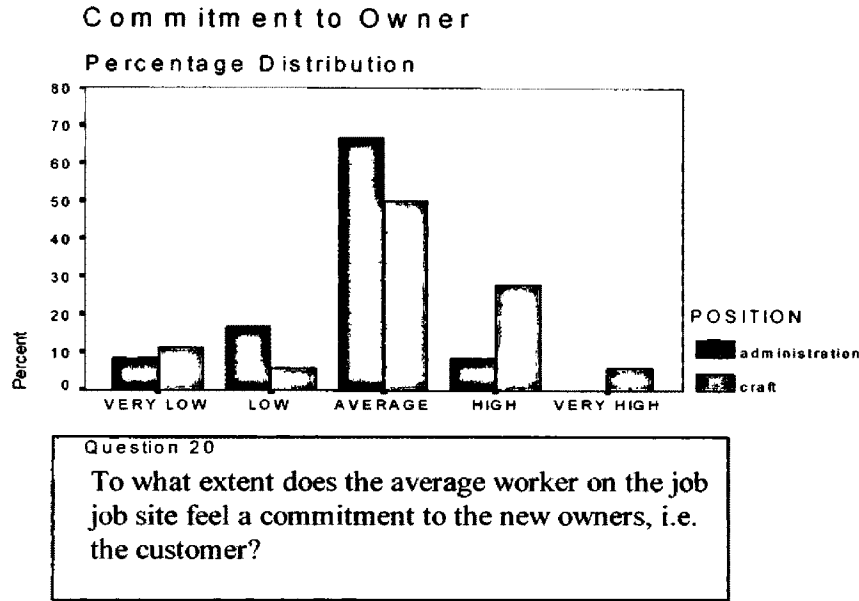
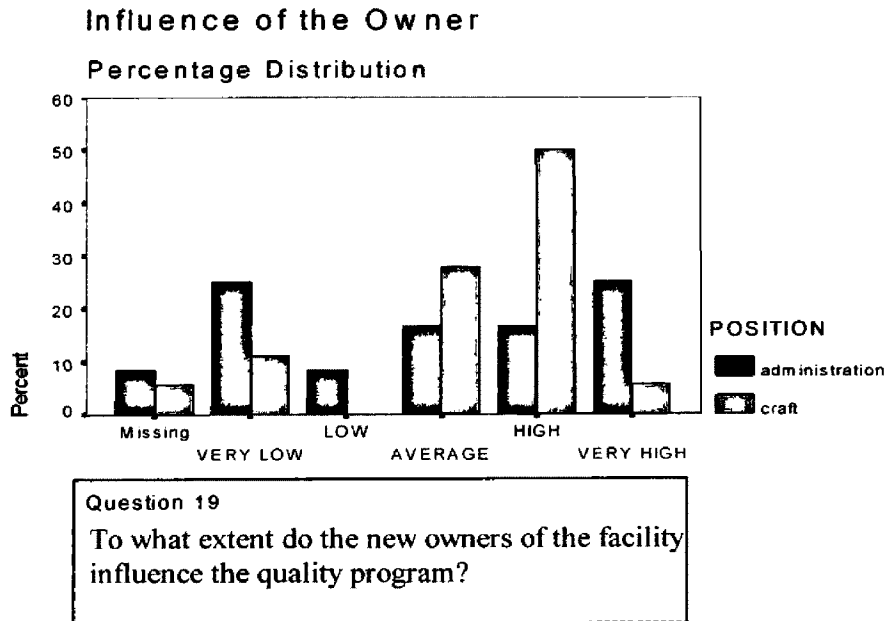


Figure 6



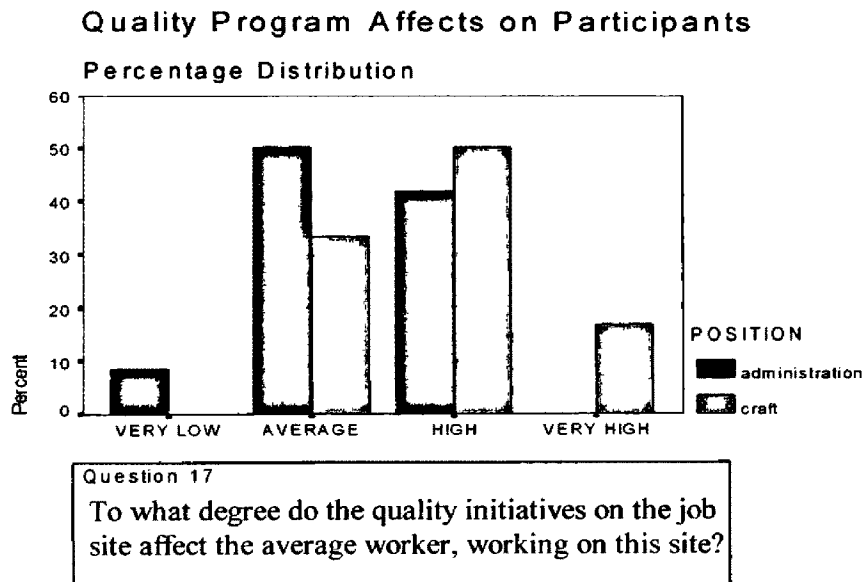
Moreover, this goes against the grain of the customer-driven TQM program. Alhire, Golhar, and Waller (1994) conducted a comprehensive review of the TQM literature and identified the ten important constructs of TQM implementation, and the second of these ten was customer focus. Lam (1995) found that total quality management program might place too much emphasis on customer satisfaction and not enough on employee satisfaction. Further, Lam (1996a) found that almost all respondents (including front-line employees) in a total quality management survey indicated that the main objectives of the total quality management programs was to satisfy customers. Yet, Lam (1996a) goes on to say that total quality management does not necessarily enhance customer satisfaction. Thus, this study indicates that a non-customer driven program can be successful.

Perceptions

Administration perceives the affects of quality management differently than craft. The results of this study indicate that there is a difference in perception between administration level participants and craft level participants, particularly with regard to the affects on the craft level workers. Project administration participants often underestimated the actual and/or perceived benefits to the worker, or at least underestimated the perceived benefits to the worker. This finding shows that the craft level participants perceive that they gain more from the program than the

administrative level participants thought. For example, when the participants were asked to what degree the program benefits outweighed the program costs to the average worker, craft-level participants generally scored slightly higher. The mean score for project administration participants was 3.33 with a standard deviation of 0.78, while the mean score for craft-level participants was 3.71 with a standard deviation of 0.85. Figure 7 shows the percentage distribution for this question. Figure 7 illustrates how both the craft level workers answered the question as well as how project management answered.

Figure 7



Also, when asked to what degree the average worker gained satisfaction through the quality management program, craft-level participants scored higher. The mean score for administration was 3.46 with a standard deviation of 0.88, and craft level participants' scored a 3.76 mean

with a standard deviation of 0.56. Craft-level participants thought that the program affected them more than administrative level participants thought they were affected. When asked to what degree they felt that the quality management program affected the average worker, administration scored 3.38 with a standard deviation of 0.77, while craft-level participants scored 3.76 with a standard deviation of 0.75.

Other researchers have found similar results. In a survey of employees working in a total quality management company, Yavas (1995) found that office hourly staff scored higher on employee commitment to quality than did management, and concluded that there are differences in the perceptions of quality related issues. Lam (1997) indicated that managers and front line workers respond differently to influence tactics that affect their willingness to comply with total quality management. He also found that managers and front line workers respond to different power bases in a study of willingness to comply with total quality management. For example, management responds more to expert power, whereas frontline workers respond to reward power and legitimate power. Oakland and Aldridge (1995) examined the role of organizational culture in total quality management, with regard to different levels of the organization, and concluded that senior management's group culture was different from that of staff. He reported that the biggest gap was seen at middle and lower levels of the organizational structure.

The gap in perception between front line workers and management has been explained in the literature. Lam (1996b) indicated that managers focused too much on the “hard side,” or statistical process control and other tools, and did not focus enough on the “soft side,” or the employee satisfaction side. He also reported that middle managers are more resistant to changes, e.g., to quality initiatives, than are front-line workers. Lam (1996b) also suggested that middle managers perceived more changes in their jobs due to total quality management, than do front line workers. Oakland and Aldridge (1995) stated that an absence of casual walkabouts combined with poor communication suggested that senior management was ill informed and “out of touch” with staff and their needs. The need to research the impact of total quality management interventions on employee attitudes was advocated by Peccie and Wood (1995) as well, because these affects are as yet unknown.

In summary, it is not uncommon for perception of management to differ from the perceptions of front line workers, particularly with regard to quality concepts. Furthermore, much of the construction industry believes that craft level workers have nothing to add to the quality management program. The combination of these facts make it understandable why the administrative level participants underestimate how the craft level participants perceive the affects of the quality management program. The results of quality management implementation very much depend on the

involvement of the craft level workers. Managers must be careful not to underestimate how craft level workers perceive their place in this program.

Union Participation

Union participation would enhance the probability of success for quality initiatives. Craft level workers may play a larger role in the success of quality management programs than much of the past research suggests. Therefore, employees should receive more orientation and training with regard to employee empowerment and quality concepts, and unions are in a good position to provide that training. In fact, a General Foreman from Murphy Co. made an interesting suggestion regarding craft level involvement. He thought that tradesmen should be trained in to the TQM concepts by the union halls. This suggestion is supported by Burati et al. (1992), when they suggest that it may be possible for unions to provide TQM training.

Other researchers have held the same view toward unions. Guimaraes (1997) stated that, "Total quality management usually redirects an organization's overall goals and profoundly influences the work practices of individual employees. Employees and unions must be involved up front, followed by renewal of education and training programs." Furthermore Snape et al. reported:

To what extent has trade union position been a barrier to the effective implementation of TQM? In some cases,

union representatives have seen the introduction of TQM as a management issue which does not directly concern the unions, but as TQM is implemented, and the organizational and industrial relations implications become clearer, union representatives may become increasingly concerned. Unions nationally have expressed concern about the impact of initiatives such as TQM, employee involvement, HRM and customer service programs, since such developments threaten to establish rival channels of communication and emphasize individual and small group over collective issues.

Bowen and Lawler (1995), indicated that some unions are moving toward accepting employee empowerment and a few have advocated it for a long time. There has been evidence of success with unions representing steelworkers, communication workers, and autoworkers. But the landscape is cluttered with failed empowerment efforts that were undermined by lack of union support or commitment as well.

Godfrey et al. (1997) made the following assertion: "to be successful, TQM can not be imposed on the workforce and where there is high membership, union support will probably be required. Evidence from the USA (United Steelworkers Association) suggest that the greater the involvement of the unions in the TQM effort, the greater the positive impact experienced on direct performance outcomes." More research should be done on the effect of craft level involvement in the success of quality management programs. This research must include the impacts unions will have on the success of quality management programs. A partnership with unions would allow for real success in implementing quality management initiatives.

Additionally, in his master's thesis for the University of Montana, Robert Blumhagen (1994) concluded that total quality programs jointly administered by union and management appeared to be the most effective method of ensuring TQM survival. He went on to state that those companies which pursued strong partnerships between management and union employees will be part of the small percentage of firms which see TQM efforts succeed.

SUMMARY

At the outset of this study, four objectives were established. Objective one was to determine whether or not quality management programs were being used in the construction industry. Both the literature review and the case studies confirm that quality management is indeed being practiced on construction job sites. The evidence of both forms illustrates that various types of programs are being utilized. Further, the programs are being utilized to varying degrees of complexity as well as for different reasons.

Objective two was to determine what levels in the organization were involved in the quality management programs. Here the literature review uncovered only cases where project management and owners' representatives took part in the quality management programs. Yet, the case studies illustrate that craft level workers can and are becoming involved in these

programs. In fact, survey results indicate that craft level workers may feel more involved than management supposes.

The third objective dealt with the benefits of quality management programs for the contractors. Despite lack of empirical evidence with regard to turnover rates, absenteeism, and cost savings associated with the programs, both the literature review and the case studies point out positive affects. Various cases in the literature site specific cost saving ideas that were gained through quality circles as well as perception of overall cost reductions. The management of the four firms studied also pointed to specific examples, and they too expressed their belief that the programs led to cost reductions.

The fourth objective is inexorably connected to the third objective. As one management respondent pointed out, "If your employees are happy, then your customers are happy." Almost all craft level worker respondents indicated that they gained satisfaction from the program and felt more involved. Similarly, the literature reveals that program participants gain satisfaction, more quality consciousness, and decision-making freedom.

This study reveals an entire area in need of further research. The affect that the attitudes and feelings of the craft level worker have on quality management programs should be further studied. Similarly, how the quality management programs in turn affect those workers could result in significant findings. It has always been assumed that management of the

organization holds the key to success for the quality management program. This view is short sighted, considering the overwhelming impact the workers have on the culture and viability of the organization.

Between the programs reviewed in the literature and those studied in the field, many methods of utilizing quality management become apparent. In some cases a simple approach is utilized, and in other situations more regimented programs are in place with full total quality management implementation. As is true in other industries, the type of quality management program must fit the organization.

There is no doubt that those people involved the quality management programs reviewed are benefiting from them. These benefits take many shapes and forms. For the contractor, the primary benefits are profit and reputation. Overall, however, the most significant benefit may be the sense of involvement and camaraderie that program participants share.

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APPENDIX

Data Collection Questions

1. Are there programs or initiatives designed to enhance the quality of your work and/ or work environment on this job site?
Comments:
2. Have you participated in programs or initiatives designed to enhance the quality of your work and/or work environment on this job site?
Comments:
3. What is your role in this program?
Comments:
4. How many people are involved with the quality programs in place? How many groups are involved?
Comments:
5. Who is eligible to participate in these programs?
Comments:
6. Do diverse groups of workers, or workers of various crafts, meet specifically to discuss quality and/or efficiency issues facing the project?
Comments:
7. Are employee involvement activities practiced on this job site?
Comments:
8. Have the workers on the job site received any training for their involvement in quality initiatives?
Comments:
9. Do the customers of the firm require a quality management program?
Comments:
10. Is the quality management program standard for every job site, or is it customized to the particular job?
Comments:
11. Do you require subcontractors to participate in the same quality initiatives?
Comments:
12. How do workers on the job site make suggestions regarding project operation, techniques, quality, and goals?
Comments:
13. To what degree do you feel involved in quality programs taking place on the job site, relative to other sites you have worked on?
Very Low/ Low/ Average/ High/ Very High
14. In your opinion, to what extent does the average worker feel responsible for the quality of his/her work?
Very Low/ Low/ Average/ High/ Very High

15. To what degree do you think workers on the job have the freedom to make their own decisions regarding their work?
Very Low/ Low/ Average/ High/ Very High
16. To what degree do you feel workers on the site maintain a commitment to the company (contractor) over and above their respective trade unions?
Very Low/ Low/ Average/ High/ Very High
17. To what degree do the quality initiatives on the job site affect the average worker, working on this site?
Very Low/ Low/ Average/ High/ Very High
18. How often do workers of diversified crafts come together to complete a task or solve a problem?
Very Seldom/ Seldom/ Occasionally/ Often/ Very Often
19. To what extent do the new owners of the facility influence the quality program?
Very Low/ Low/ Average/ High/ Very High
20. To what extent does the average worker on the job site feel a commitment to the new owners, i.e. the customer?
Very Low/ Low/ Average/ High/ Very High
21. Given the time and effort put forth in the quality program, to what extent do you think the benefits of the program for the company outweigh the costs?
Very Low/ Low/ Average/ High/ Very High
22. To what extent do you think the average worker feels that the personal benefit from his/her active participation in quality initiatives outweighs his/her cost in terms of their own time and effort?
Very Low/ Low/ Average/ High/ Very High
23. To what degree do you think workers gain satisfaction through the quality management program?
Very Low/ Low/ Average/ High/ Very High